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Still having issues?

- Call 866-782-6258 (M-F, 8 AM-8 PM ET)
- Email customerservice@PhysicalTherapy.com

Total Knee Arthroplasty Acute Rehabilitation

Starts at Home

John Gose, PT, MS, OCS

1

Learning Outcomes

After this course, participants will be able to:

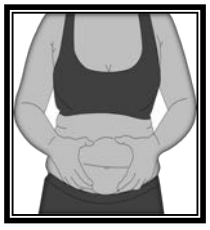
- Identify at least three interventions discussed from current literature for home care patients that underwent joint arthroplasty.
- List at least four acute/emergency signs and symptoms of complications in post joint arthroplasty.
- Outline a 30-day clinical guideline with a focus on recovery.
- Identify at least four clinical outcomes that assess patient progress for Knee arthroplasties.

2

Total Knee Arthroplasty

TKA: Demographic of Surgery

- AHRQ summary
- Age – average 70
- 66% were female
- 33% obese (BMI >30)
- 90% had OA
- Outcomes used
- Knee Society Score (KSS)
- Hospital for Special Surgery Scale (HSS)
- WOMAC
- SF-36 – physical function component



TKA: Demographic of Surgery

Per 1,000 Surgeries

NIH Consensus Conference on TKR

- Males
  - 4.8 for white males
  - 3.5 for Hispanic males
  - 1.9 for African American males
- Females
  - 5.9 for white women
  - 5.4 for Hispanic women
  - 4.8 for African American women.

TKA: Indications

- Pain – Moderate to Severe
- Functional Limitations
- + X-ray joint damage
- Mechanical Dysfunctions
- Failed conservative care
- Progression from prior status (previous surgery)
- Controlled Inflammatory Dis. (RA)
- Low risk factors – esp. for same day discharge
- NIH Consensus Conference on TKR

TKA: Risk Factors for longer LOS

- Advanced age
- High BMI
- Higher Charlson Comorbidity Index
- Lower VR-12 Mental Capacity Score
- Female gender

TKA: Contraindications to Surgery

- Active local / systemic infections
- Relative Contraindications
  - Severe Periph. Vascular disease
  - Various neurological pathol.
  - Uncontrolled diabetes
  - Cardiopulmonary decreased function

(stop smoking 2 months prior)

NIH Consensus Conference on TKR

TKA: Contraindications

- Patient Selection via decision-assisting standardized instruments
  - WOMAC – Western Ontario and McMaster Univ. Osteoarthritis Index
  - KSS – Knee Society Score
  - HSS – Hosp. Special Surgery Scale
  - New Zealand Priority Criteria for Major Joint Replacement
- Mini Mental Status Exam (MMSE) can help to identify patients at high risk for delirium.

Bilat. TKA (Same day vs Staged) Contraindications

NIH Consensus Conference on Bilat. TKR

- Age > 75
- Amer. Society Anesthesiol. –Class III
- Active ischemic heart disease
- Decreased left ventricle function < 50% Ejection Fraction
- Pulmonary disease – Mod. to severe
- Dyspnea, SOB, poor functional capacity
- BMI > 40 kg/M2
- Poorly controlled diabetes
- Cerebrovascular Disease
- PVD of LE's with stents of vascular bypass.
- Staging no sooner than 3 months

TKA: Pre-Op Preparations

- PREhab. Reduces post op care and cost 29%
  - Timing
    - Min. 3 weeks prior to surgery
  - Referral from….
    - PCP, Ortho, Rheum., Pulmonology
  - Standard Therapy for OA
    - Insurance covered
  - ROM, Strength, Power, Balance, Gait, Assistive devices
  - RAPT - Score Risk Assessment Tool

TKA: Pre-Op Preparations

Education

- Class
- Booklets
- Online videos
- Interdisciplinary
  - Nursing
  - Rehab
  - Home Care
  - Medical/Dental workup
  - Home coaches

Medical / Dental workup

Education class:

- 2-4 weeks prior to surgery
- = Reduced use of pain medications, reduced anxiety, and improved patient satisfaction.

TKA: Prosthesis Selection

- Age of patient - >80 of concern
- Level of post-op function
- Weight : Obese = infection and wound healing problems
- Level of cartilage destruction
- Need for tibio-femoral rotation
- Integrity of ligaments, capsule, bone, muscle

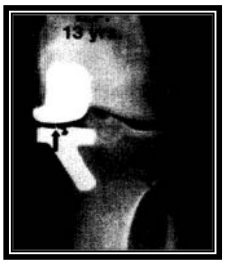
TKA: Prosthesis Variations

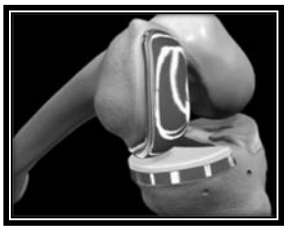
<u>On Plastic</u>

- Cobalt Chrome
- Titanium
- Ceramic
- Oxcynium
  (with zirconia)

TKA: Prosthesis Variations

Unicompartmental
Easy in
Easy out if needed

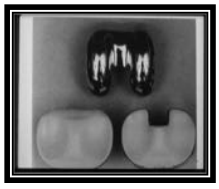




TKA: Prosthesis Variations

Total Knee Replacement

Modular
(Posterior Stabilizing)



PCL sparing
(retaining)

Total knee

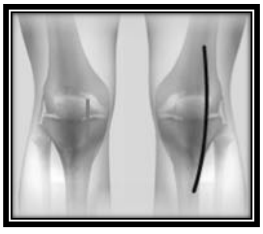
- Others - Medial Pivot, Rotating platform, Mobile-bearing
- Patient should have an information card about prosthesis design and date of manufacture

TKA: Interface Variations

Cemented	Uncemented
▪ Methylmethacrylate (13-15 min.)	

TKA: Surgical Approach

- Standard medial incision
  - Easy, exposure, pat. necrosis
- Sub-vastus
  - Earlier ROM, quad function, pat. tracking, pain, satisfaction
- Mid-vastus
- Lateral –
  - Valgus knees
- Minimally Invasive (incision)

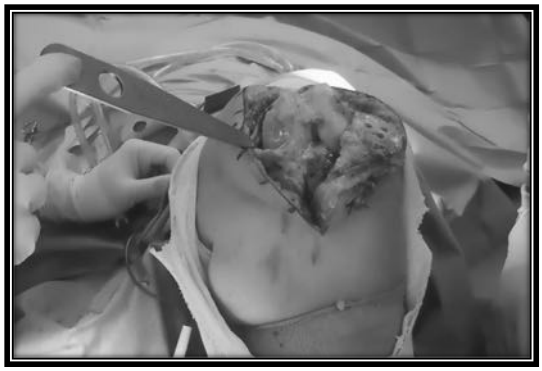


TKA: Surgical Approach

- Standard medial incision with lateral patellar peel

TKA: Minimally Invasive vs Standard

- Exposure and patella drilled

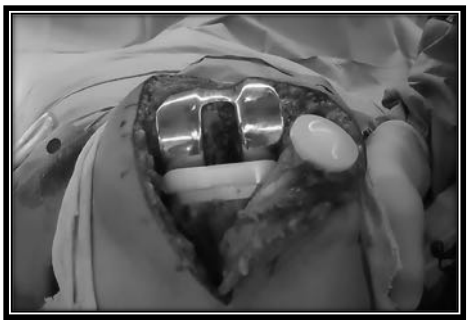


TKA: Minimally Invasive vs Standard

Jigged and cutting

TKA: Minimally Invasive vs Standard

In place and ready to close



TKA: Additional Approaches

- Quadriceps Snip
- V-Y Quad. advancement
- Femoral Peel

TKA Surgery

This YouTube surgical video shows the solid basics of how a knee is prepared, surgically managed, and tested on the table.

- https://youtu.be/vJGJJOA1Me0?list=PLv18nslAXknq0SqU4Tl_sfkD5p89UUkNy&t=29

25

TKA: Surgical Complications

- Malalignment
- Fracture
- Bleeding
- Infection
- PE
- Stroke
- Death

- Highest levels of surgeon / hospital complications
  - Surgeons doing < 12 / yr
  - Hospitals that do < 25 / yr

TKA: Perioperative Complications

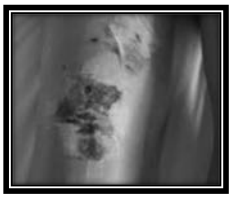
- Effusion – 100%
- Pain – 100%
- Infection – 1-3%
- Wound Dehiscence
- DVT / PE - .5 – 4%
- Arthrofibrosis - <2 %
- Heterotopic Ossification < .2%
- Perioperative mortality - .5%

TKA: Perioperative Complications

Infection – 1-3%

Warning signs of a possible Peri-Prosthetic Infection (PPI) like MRSA, Strep, MSSA are:

- Increasing redness, tenderness, or swelling of the knee wound
- Drainage from the knee wound
- Shaking chills
- Increasing knee pain with both activity and rest
- Persistent fever (higher than 100°F orally)



TKA: Perioperative Complications

DVT / PE - .5 – 4%

Warning signs of possible blood clots in the leg include:

- Increasing pain in your calf
- Tenderness or redness above or below your knee
- Increasing swelling in your calf, ankle, and foot

TKA: Perioperative Complications

DVT / PE - .5 – 4%

Warning signs that a blood clot has traveled to the lung include:

- Sudden increased shortness of breath
- Sudden onset of chest pain
- Localized chest pain with coughing

TKA: Post –Op
Short & long-term Complications

- Prosthesis loosening
- Avoidance of Weight bearing
- Heel decubitus
- Cardiac
- Pulmonary

TKA: Post Op Short Term Outcomes

- Acute Hospital Stay
  - LOS
  - Pain levels, meds used
  - AROM / PROM
  - Operative time
  - # PT / OT Sessions
  - Ambulation distance
  - Success – Stairs, ADL's
  - Cost

TKA: Post Op Guidelines

Phased Rehabilitation

TKA: When Does Acute Care Start – End?

Wound healing dictates phase of recovery …..not location nor disposition of caregivers.

Mother nature healing works in 30-day cycles

Today's literature is leaning towards limited supervised home care or tele-rehabilitation.

Outcome studies show negligible differences in functional scores (WOMAC, KOOS), Pain levels, functional ADL's, depression levels, Safety, and Quality of Life scores for home vs outpatient therapies, or supervised vs limited supervised programs, during both short and long-term patient population assessments. (1-5 years)

Scrutiny of the cost of care is increasing, with Rehabilitation is the crosshairs of those who pay for services. One on One, Group, Home-based, Telerehabilitation.

Therapies and Therapists must do more to prove value of clinical services for Joint Arthroplasty patients !!!!!

Hospitals and Universities must join together to support the costs of clinical research in this area….whether to prove or disprove need of this service to this population of patients.

TKA: Post Op Guidelines

- Phased Rehab. (with wound healing concepts)
  - Acute: maximum protection
    - 0 – 2 weeks
  - Sub Acute: Min. / Mod. protection
    - 2 – 6 weeks
  - Chronic: Min protection to Independent
    - > 6 weeks

POSTOPERATIVE REHAB.

EXAMINATION

History and Systems Review

- Surgical Report (approach, prosthesis type, complications, ROM)
- Post-operative weight bearing status
- Chart Review
- Medications
- Prior Functional Level
- Living Environment

POSTOPERATIVE REHAB

TESTS AND MEASURES

- Arousal/Attention/Cognition
- Gait/Locomotion/Balance
- Integumentary integrity (sensation/bleeding/circulation)
- Muscle Performance
- Pain
- ROM
- Self-care and home management

POSTOPERATIVE REHAB

GOALS / OUTCOMES

INPATIENT PHASE

1. Achieve independent / supervised functional level for transfers / gait / stair climbing maintaining WB status
2. Reduction of pain / inflammation / bleeding
3. Functional straight-leg raising without extension lag (quadriceps function and control)
4. Passive / Active assisted ROM of 5 to 90 deg.

Getting ROM Efficiently
CPM – Yes or No

- If you do use CPM:
  - Flexion protocol – begin 0-30 degrees and increase ROM 5-10 degrees per day
  - Extension protocol – begin 60 – 90 degrees and increase ROM 5-10 degrees per day
  - Less post-operative swelling and earlier gains in flexion but no difference at 6 months post-op

TKA: Acute Phase

No

There is enough evidence to not support the short-term gains in acute care vs the costs

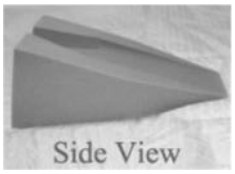
Reduction of Pain / Inflammation / Bleeding

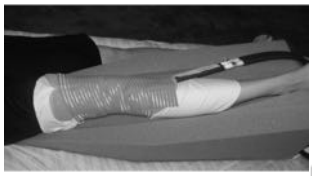
Pain reduction and management of post-op swelling are instrumental in restoration of ROM:

- External Compression devices
- Elevation
- Patient Controlled Anesthesia (PCA)
- Cryotherapy
- Ankle pumps
- TENS
- MOTION - neuromodulates pain and provides a mechanical stimulus to collagen synthesis and alignment

LRU pillow wedge-Elevation

- 4 hours per shift, applied by recovery, maintained by nursing, > $90/pillow
- Add compression / cold devices to max. results.
- Goes with patient





INDEPENDENT / SUPERVISED FUNCTION
TRANSFERS / GAIT / STAIRS

INTERVENTIONS

- Transfer/Gait/Stair Training –
  - Stairwell use – safety guidelines
  - Tell nursing, buddy system, door open, call bells in stairwell, mobile phone system
- Efficient use of assistive device

  Walker height that optimizes standing posture/stability.(30 degrees of elbow flexion is optimal in elderly with postural mal-alignment)

FUNCTIONAL SLR WITHOUT EXTENSOR LAG

- Restore Active Quad and Hamstring control
- Initially, more frequent sessions with lower repetitions (10-12)
- Muscle Activation vs. strength gain
- Avoid muscle fatigue
- NMES as early as POD 2

FUNCTIONAL SLR WITHOUT EXTENSOR LAG

(Restore Active Motor Control In All Muscle Groups)

- Quad sets/glut sets/hamstring sets (Q-Score)
- SLR ????
- Active short arc quad exer.
- Seated extension / FAQ
- Heel slides (powder board/sliding board)
- Church pew rocking
- Rhythmic Stabilization (manual, t-band)

AAROM OF 5 TO 90 DEGREES

- Knee flexion and extension
  - SAQ
  - Heel slides
  - Dangle protocol at bedside
  - Active flexion/extension seated
  - Caution with Overpressure

ACTIVE ASSISTED ROM 5 TO 90 DEGREES

CONSIDERATIONS FOR WOUND STABILIZATION WITH ROM

- Inflammatory phase
- Clot formation - homeostasis
- Collagen synthesis
- Suture line is fragile - overaggressive PROM can induce bleeding and scar separation
- Avoid blanching of neo-capillaries in incision (PROM or CPM)

ACTIVE ASSISTED ROM 5 TO 90 DEGREES

- Avoid positioning in flexion
- Sleep in knee immobilizer with pillow under distal ½ of gastroc to facilitate extension
- Strongest predictor of postoperative flexion is preoperative flexion
- Most important factors for ROM and functional success
  - Early Control of Pain and Inflammation

TKA: POD 0 / 1

- PT
  - Eval
  - Dangling
  - Weight Bearing
  - Bed exercises
    - Ankle pumps
    - SLR
    - FAQ
    - Heel slides-flex and abduct

- OT
  - Eval
  - Discuss expectations
  - Bed mobility
  - Leg lifter
  - DME needs assessment




TKA: POD 0 - 2

PT

- Ambulation
- RW, WBAT
- AROM
- Patellar mobility



OT

- Transfers: toilet, tub, shower
- Discuss expectations

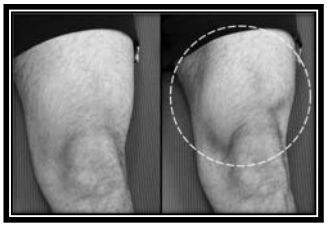
TKA: POD 0 - 2

PT

- Advances in ambulation, WBAT
- AROM, PROM
- FAQ, Mini-squats
- Step ups, Stairs
- Disposition decision

OT

- Don-Doff: clothing
- Household activity
- Disposition decision



TKA: POD 1-2

PT

- ROM: (-5 – 75 deg.)
- Strength: (Indep. SLR)
- Effusion management
- Ambulation: (120-150 ft)
- Pain: (0 – 4 / 10)
- Stairs: (13, rail, supervised)

TKA: POD 1-2

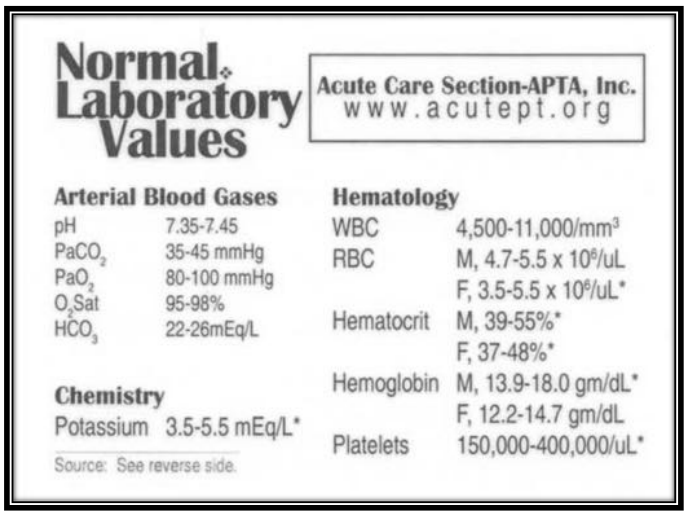
OT

- Bed mobility (I)
- Transfers (I)
- Toileting (I, raised)
- Hygiene (I)
- Dressing (I – with devices)

POST-OP: WEEKS 1-2

- Isometrics (quadriceps / hamstrings / gluteals) TKE
- Standing closed chain isometrics / Rhythmic Stab.
- SLR (supine, elbows, extended arms)????
- Stretching (gastroc / soleus, hamstrings, quads)
- Heel slides
- Soft tissue/scar mobilization
- Patellar mobilization
- Seated knee flexion foot against wall
- Stationary cycling when can flex knee 90 degrees

Normal Lab Studies



Normal Laboratory Values

Acute Care Section-APTA, Inc.
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Arterial Blood Gases

pH	7.35-7.45
$PaCO_2$	35-45 mmHg
PaO_2	80-100 mmHg
O_2Sat	95-98%
HCO_3	22-26mEq/L

Chemistry

Potassium	3.5-5.5 mEq/L*

Source: See reverse side.

Hematology

WBC	4,500-11,000/mm^3
RBC	M, 4.7-5.5 x 10^6/uL
	F, 3.5-5.5 x 10^6/uL*
Hematocrit	M, 39-55%*
	F, 37-48%*
Hemoglobin	M, 13.9-18.0 gm/dL*
	F, 12.2-14.7 gm/dL
Platelets	150,000-400,000/uL*

TKA: Red Flags

- DVT – 8%
  - Hot, swollen, tender calf, knee, undiminished pain
- PE - 2.8%
  - "Sudden" SOB / localized chest pain
  - Decreasing Incentive spirometry

Abn. Lab values alerts
- Pro time (PT / PTT)
- INR
- H / H for bleeding time

Infection
- Core temp. > normal
- Foul drainage

Lab Values & Restrictions on Exercise

Reviewed and updated 2015

Normal Laboratory Values

Acute Care Section-APTA, Inc.
www.acutept.org

Exercise Guidelines

Hct	Platelets	Hgb	WBC	Exercise
<25%	<20,000	<8	<5,000 with fever	NO exercise
25-30%	20,000-50,000	8-10	>5,000	Light exercise
>30%	>50,000	>10	>5,000 (as toler.)	Resistive exercise

Source: Acute Care Perspectives, Winter 1995, pp.7-11. Except where noted with * Methodist-LeBonheur Healthcare (Memphis, TN) standard adult lab values May 2003.
❖Materials distributed by the Acute Care Section are *guidelines*, and do NOT substitute for clinical judgment.

Coagulation – PT, PTT, and INR

- Lab test for coagulability:
  - Prothrombin Time (PT) (12-13 sec.)
  - Thromboplastin Time (PTT) (30 – 50 sec.)
- INR:
  - Normal .8 – 1.2
  - A level of 2 – 3 for those on anticoagulation therapy for CAD, CVD, DVT, A-Fib.
  - Beware of wound dehiscence or any bleeding issue even with minor trauma.

Potassium levels

Potassium (K) affects skeletal and visceral muscle function. Normal values are 3.5-5.0 mEq/L. Low K levels (< 4.0) can lead to *

1. Lethargy,
2. Abnormal muscle contractibility,
3. Decreased muscle strength, up to paralysis. Abdominal distention due to low tone abdominal wall,
4. Disorientation, Hypotension,
5. Muscle twitches and tetany,
6. Polyuria,
7. Marked EKG changes (flattening T wave and dysrhythmias)
8. Clammy skin,
9. Respiratory failure

* Acute Care APTA Section – Lab values publication

TKA: Red Flags

- Weight bearing –
  - Pain and / or instability
- Wound dehiscence
  - seepage
- Mentation changes
  - A and O x 3

TKA: Based on Wound Healing
Sub-Acute Phase - Weeks 1-6

Rehab, SNF, Home Care
Disposition determined by local practice and Insurance practices.

PT

- Effusion control
- ROM
- Strength / Power
- Scar / Wound management
- Pain
- Gait/Ambulation/Balance

OT

- Bed mobility
- Transfers
- ADL's
- House layout and Housework
- Preparation for auto

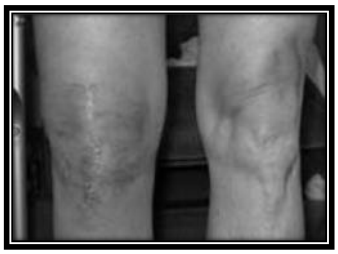
POSTOPERATIVE REHABILITATION
Sub-Acute Goals / Outcomes

- AROM 0 – 115 degrees
- Lower extremity strength to 4 to 4+/5
- Ability to perform double-leg squat to a 90 degree joint angle without a handhold
- Improved neuromuscular control/balance/proprioception (ability to achieve single-leg stance time of 80% of uninvolved leg)

REHABILITATION
POST-OP DAY 6-14

OBJECTIVE: Wound Maturation

- Wound drainage should be scant or absent
- Reduction in swelling – Daily Circumference measure
- Staples removed day 10-14 – Home nurse/PT/ or Ortho at 1st follow up visit



REHABILITATION
POST-OP DAY 6-14

OBJECTIVE: Wound Maturation

- **Week 2-3 is critical time to gain ROM**
  - Fibroblast infiltration and collagen forms(scar)
  - Swelling and inflammation will help dictate assertiveness of Rehab.
  - Patello-femoral joint mobs / scar massage

POST-OP WEEKS
Interventions

- Stretching (gastric. / soleus, hamstrings, quads)
- Soft tissue/scar mobilization
- Patellar mobs – esp. with lack of AROM / PROM
- Seated knee flexion with foot against wall
- Stationary cycling when knee flexes > 90 degrees

POST-OP WEEKS
Interventions for Total Leg Strength

- Isotonics - quadriceps / hamstrings / gluteals, hip flexors
- Standing closed chain
- SLR - supine, sidelying, prone
- TKE > SAQ > FAQ



POSTOPERATIVE REHABILITATION
Goals / Outcomes

OUTPATIENTS

- Independent, pain-free gait pattern with assistive device prn over all surfaces
- Independence in progressive home TE
- Return to previous functional status for ADLs, vocational and recreational activities

TKA: Chronic Phase - OP
Weeks 6 - Discharge

- ROM: 0 to ≥ 120 degrees
- Strength / Power / Endurance
- Gait, Ambulation, Balance
  - Weight bearing, assistive devices (if any)
- Effusion control
- Pain modulation

TKA: Chronic Phase - OP
Weeks 6 - Discharge

- Indep. Functions
  - Car transfers
  - Stairs
  - ADL's
  - Household tasks
  - Community mobility
  - Driving
  - Recreational

TKA: Outcomes Acute Care and Short term (<5 yrs)

- Satisfaction
- Pain
- Function
- Mobility
- Strength –
  - (Q / HS, Hip Abd/Add, Gastroc)
- ROM
- LOS
- Knee scales

  KOOS, LEFS, WOMAC, KSS

- Lower pre-op function show greater increases yet lower absolute final function

- **Improvements (Kennedy et al)**
  - 12 weeks: greatest
  - 26 weeks: mild
  - > 26 wks : minimal

TKA: Mid and Long Term Functional Outcomes Appendix

- SF-12 or 36 - Short Form (self report)
- LEFS – Lower Extremity Functional Scale
- 6MWT - 6-Minute Walk
- TUG – Timed Up and Go (use < 3 mos)
- DGI – Dynamic gait Index
- WOMAC - Western Ontario & McMaster Osteoarthritis Index
- KSS - Knee Society Scale
- KOOS – Knee Injury and Osteoarthritis Outcome Score
- HSS – Hospital for Special Surgery Score
- Berg Balance Scale (long or short)

TKA: Mid and Long Term Functional Outcomes

		6-Minute walk	TUG
Age	Sex	Mean distance	Mean TUG time
60-69	M	572	8
	F	538	8
70-79	M	527	9
	F	471	9
80-89	M	417	10
	F	392	10

TKA: Outcomes Acute Care and Short term (<5 yrs)

- Mobility Strength ROM

(Quads, Hip Abductors)

Table 10. Patient Outcomes Following Total Knee Arthroplasty and Rehabilitation at the University of Delaware Over Time[a,b]

Time Point	Timed-Up-and-Go Test (seconds)	Quadriceps Side-to-Side Strength Difference (%)	Knee Flexion AROM (°)	Knee Extension AROM (°)	KOS-ADLS Score (%)
Preoperative (1-2 weeks)	10 ± 3	87 ± 33	118 ± 16	4 ± 5	51 ± 17
Hospital discharge	76 ± 77	N/A	84 ± 15*	5 ± 3[c]	N/A
1 month	12 ± 4	47 ± 22	99 ± 15	6 ± 4	56 ± 13
2 months	9.2 ± 2.3	62 ± 23	112 ± 12	3 ± 4	69 ± 13
3 months	8.3 ± 1.9	76 ± 24	116 ± 11	2 ± 3	79 ± 12
6 months	7.9 ± 1.8	87 ± 30	118 ± 11	1 ± 3	84 ± 12
12 months	7.8 ± 1.8	97 ± 30	121 ± 11	0 ± 3	85 ± 12
Norms	Age-matched healthy: 60-69 = 8 ± 2 70-79 = 9 ± 2 80-89=10 ± 2	About 90% is normal limb dominance	Nonoperated side Flexion = 128 ± 11 Extension = 0 Functional ROM = 0-110		100% - Perfect Comment: no patient scores 100% until > 3 months

TKA: Mid and Long Term Functional Outcomes

- (5 meter) Self Selected Walking Speed
- (5 foot) Figure of 8 Walk Test
- (5 x) Chair Rise Test
- (11 step) Stair Ascend and Descend Test

TKA: Mid and Long Term Functional Outcomes

- Knee Society Scale or the HSS
  - < 60 = poor
  - 60-69 = fair
  - 70-84 = good
  - 85 – 100 = excellent

POSTOPERATIVE WEEKS 0-2

POST-OP WEEKS 3 TO 6

- Continue exercises from earlier phase as indicated
- Add resistance with weights and/or elastic resistance for knee extension / flexion
- Hip 4-way SLR
- Closed-kinetic chain exercise in pain free range
  - Terminal Knee extension against bands or weight
  - modified leg press, heel raises,
  - wall slide, partial squats,
  - partial lunges, marching in place

To emphasize weight shift onto the surgical limb, place contralateral foot on a step during stance and sit to stand exercises.

POST-OP WEEKS 3-6

Balance progression

- Static
  - Wide to Narrow BOS
  - Firm to unstable surfaces
  - Eyes open to closed
  - Double > Single limb stance



POST-OP WEEKS 3-6

Balance progression

- Dynamic
  - Flat > uneven > ramped > steps
  - Slow > fast
  - Forward > multi directional
  - Eyes open > closed
  - Rhythmic (with music) > perturbation
  - Stepping > ambulating
  - Dancing

POST-OP WEEKS 3-6

- Balance and coordination training
  - Heel/Toe walking
  - Backward walking
  - Side Stepping
  - Single limb weight bearing
  - Foam and uneven surfaces
  - Mini-trampoline
  - BAPS
  - Eyes open vs eyes closed

POSTOPERATIVE WEEKS 3-6

- Aerobic Endurance
  - Cycling (Knee ROM 100)
  - UBE
  - NuStep (time, resistance, steps)
- Aquatic Exercise
- Progression to ambulation with/without cane as tol.

POSTOPERATIVE WEEKS 7 TO 12

- Emphasis on remaining muscle performance

  Total leg strength (esp quads, HS's and gluteals)
- ROM deficits (3 mos.: 110-120+ deg. flexion)

  with no extensor lag.
- Step-ups / Step-downs to assist with

  ascending and descending stairs / ramps / slopes
- Functional return to vocational / recreational activities
- Independence with HEP

ATHLETIC ACTIVITIES AFTER ARTHROPLASTY

RETURN TO LOW AND INTERMEDIATE IMPACT SPORTS AT 4-6 MONTHS

1. Pain should not accompany the activity or for the ensuing 24 hours
2. Sport modifications to minimize joint loading are encouraged
3. Return to sport should be done gradually

ATHLETIC ACTIVITIES AFTER ARTHROPLASTY

GENERALLY, LOW IMPACT ACTIVITIES ARE CONSIDERED SAFE.

Walking

Stationary/road cycling

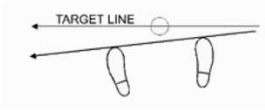
Swimming, Aquatic exercises

Golf

Cross country skiing

ATHLETIC ACTIVITIES AFTER ARTHROPLASTY

Golf suggestions:



Natural Swing technique

More open stance L leg (turn out)

Minimal rearfoot spikes

Cart to start

REHABILITATION PROBLEMS

REHABILITATION PROBLEMS

STIFFNESS = ≥ 10 degrees flexion contracture total arc < 95 degrees.

Difficulty with full extension

- Hamstring tightness - stretch
- Posterior capsule tightness/scar
- Tx - extension overpressure
- Tx - anterior glides of tibia with long axis traction (Not with posterior stop prosthesis)
- Tx - extension splint at night

STIFFNESS

- Application of heat
- With Low load prolonged stretch
- Mobilization – Femur-Tibia
- Stretch gastrocnemius
- Massage and myofascial work
- Dynamic splint/brace
- Injections, casting

REHABILITATION PROBLEMS

EXTENSION LAG

- Eliminate Edema – massage, elevation, Game Ready
- Strengthen entire quad - in 0-30 deg and at 90 deg ROM

  SAQ

  Lateral Step Ups

  NMES (2500 Hz, modulated 50 bursts/sec,10/50 duty cycle,2 sec. ramp up)
- Closed chain isometrics (wall seats will focus on VMO)

REHABILITATION PROBLEMS

Extensor Strength

- Non operated quads

Weakness predicts decreased 1 and 2 year outcomes in the TUG, Stair climb test, and Knee Outcome Survey

Work both quads early and often

REHABILITATION PROBLEMS

- Difficulty with Flexion: Causes =
  - Edema
  - Hamstring weakness
  - Quadriceps tightness
  - Pain pre-patella bursa
  - Scar / Adhesions / Arthrofibrosis

REHABILITATION PROBLEMS
Difficulty with Flexion - Interventions

- CPM at Home ≥ 30 days
- Anti edema tasks
- Patellar mobilizations (superior for baja, inferior for alta)
- Stretch quads supine, sidelying or prone
- (SKTC for capsule; prone heel to buttock for Quads)
- Friction Massage

STIFFNESS

Arthrofibrosis =

1. Flexion and extension diminished
2. 1 – 15 %
3. Aggressive PT required
4. Dynamic splint / brace
5. Injections
6. Manipulation (within 3 months)
   Increased ROM 20 – 30 degrees
7. Scope / open debride
8. Revision

REHABILITATION PROBLEMS

- **Patello-Femoral Instability**
  Partially due to surgery
- Extensor mechanism imbalance with:
  - Excessive tightness of lateral retinaculum
  - Weak and / or poorly timed VMO firing
  - Component Malalignment

Minor tracking problems can be eliminated by restoring VMO firing timing plus quad strength and stretching of lateral structures.

REHABILITATION PROBLEMS

Tibio-Femoral Joint Instability

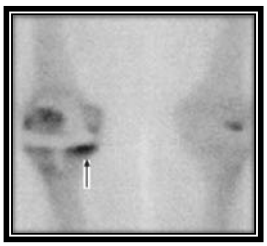
- Complaints of knee giving away, slipping, or loose knee



- Laxity on varus / valgus testing or AP stresses
  If not candidate for revision
  will require functional bracing

TKA: Delayed Failure

- Failure rate is 1% / year
- Typically due to activity levels
- Most common factors
  - < 55 y.o.
  - Male
  - Obese
  - OA
  - Men with RA
- Triple-phase bone scintigraphy (TPBS)

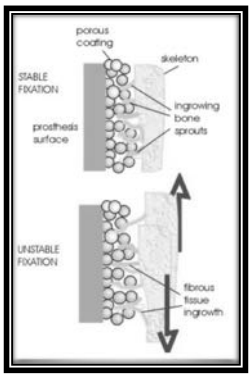


TKA: Reasons for Revision

- Fracture or dislocation of the patella,
- Instability of the components or aseptic loosening,
- Progressive and substantial bone loss
- Infection:

  Isolation of enterococcus / streptococcus species

- Periprosthetic fractures



TKA: Revision

Goals

Single vs 2 stage revisions / exchange surgery

- Restoration of mechanical & rotational alignment,
- Restoration of joint line and space,
- Achievement of stable implant fixation.
- No / reduced re-infection

Oh yea and of course

- Reduce Pain and Improve Function

TKA: Revision Outcomes

- 70% Good to excellent at 5 years
- Better for loosening than infection
- Pain relief variably (better with the primary TKR)
- ROM, Strength, and function (better with the primary TKR)

TKA: Salvage

- Primary Indication = Infected revised TKR.
- Types of Salvage
  - Resection arthroplasty (usually reserved for non-ambulatory patients with persistent infections)
  - Arthrodesis
  - Above-the-knee amputation

TKA: Future Research

- Preoperative and postoperative interventions,
  - Rehabilitation Therapy
    - Early effusion control
    - Muscle re-mobilization
    - Integrated Continuum of Care = Outcomes
  - Continuity of care through the continuum:
    - Rehabilitation – efficacy and effectiveness
    - Longer term follow-up (1-10 years)
    - With all types of physical activity.

THANK-YOU

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